

Amendments to the Claims:

Please cancel claims 9 and 16-27 without prejudice.

Please amend claim 1 as follows.

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of the Claims

1. (Currently Amended) In a method of analyzing the production of one or more selected metabolites of a biochemical reaction network producing metabolites, the method having as inputs
reactions of the biochemical reaction network constructed from genomic and biochemical data,
exchange fluxes on such of the produced metabolites as are of interest as inputs and outputs to the network,
a stoichiometric matrix, developed from the reactions and including in consideration of the exchange fluxes, defining participation of each network metabolite in each reaction and exchange flux of the network, and
a system of linear equations and inequalities defining the network, the method serving to when removed from the mathematically identify deletion sets of reactions that, network, eliminate the capability of the network to produce a selected metabolite an improvement to the method comprising:
where linear equations and inequalities of the network mathematically form a convex solution space called a flux cone calculating generating vectors of the flux cone, which generating vectors are called extreme pathways; and
using the generating vectors called extreme pathways, to determine sets of reactions that, when deleted, diminish capability of the network to produce an output metabolite of interest;

wherein the determined reaction sets correspond to critical reactions of the network which, when stopped, affect the capability of the network to produce the output metabolite of interest.

2. (Original) The method according to claim 1 that, after the determining of sets of reactions, further comprises:

selecting from the determined sets of reactions those sets that totally eliminate the capability of the network to produce the output metabolite of interest;

wherein the selected sets are called deletion sets because deletion of the reactions represented by the pathways of these sets suffices to totally eliminate the production of the output metabolite of interest by the network.

3. (Original) The method according to claim 1 wherein the calculating of the generating vectors of the flux cone is by mathematical process of convex analysis.

4. (Original) The method according to claim 3 wherein the mathematical process of convex analysis comprises: calculating any of (i) a conical basis, (ii) a convex basis, (iii) a linear basis, or (iv) a combination of any of conical and convex and linear bases.

5. (Original) The method according to claim 1 wherein at least some of the constructed reactions will have an associated constraint upon the direction in which the reaction can proceed.

6. (Original) The method according to claim 1 wherein the output of interest functional properties of interest in production network; wherein the reaction sets show consists one or more the analyzed biochemical how these more one functional properties of interest can be diminished or eliminated.

7. (Original) The method according to claim 6 wherein the output of interest consists of one functional property of interest in the analyzed biochemical production network;

wherein the reaction sets show how this functional property of interest can be diminished or eliminated.

8. (Original) The method according to claim 1
wherein the biochemical reaction network analyzed represents a disease producing, pathogenic, organism; and
wherein the metabolite of interest is necessary for survival of the pathogenic organism; and wherein the method further comprises:
using the reaction set to target development of a drug that, by obstructing those reactions of the pathogenic organism that produce the metabolite necessary for survival of the organism, serves to eliminate the pathogenic organism.

9. (Canceled)

10. (Withdrawn) The method according to claim 1
wherein the biochemical reaction network analyzed represents a disease producing, pathogenic, organism; and
wherein the metabolite of interest, produced by the pathogenic organism, is deleterious, inducing disease; and wherein the method further comprises:
using the reaction set for targeting the development of a drug that, by obstructing those reactions of the pathogenic organism produce the metabolite that induces disease, serves to eliminate the deleterious, disease-causing, function of the pathogenic organism.

11. (Withdrawn) A drug developed in accordance with the method of claim 10.

12. (Withdrawn) The method according to claim 1
wherein the reaction network analyzed is an organism producing desired bio-molecules of value and undesired bio-molecules of both no value; and
wherein the metabolite of interest produced by the of the undesired valueless bio-molecules;
and wherein the method further comprises:

using the reaction set to metabolically re-engineer the organism to fail of those reactions that produce the metabolite of that is undesired and valueless, therein eliminating production of undesired valueless bio-molecules while permitting production of organism is desired valued bio- molecules.

13. (Withdrawn) A metabolically re-engineered organism developed in accordance with the method of claim 12.

14. (Withdrawn) The method according to claim 1
wherein the reaction network analyzed is an organism producing both desired bio-molecules of value by multiple metabolic routes; and

wherein the metabolite of interest is produced by one of the routes of the organism; and
wherein the method further comprises:

using the reaction set to metabolically re-engineer the organism to fail of those reactions that produce the metabolite of interest via the one route, therein by eliminating production of metabolite via this route, nonetheless that the metabolite is of value, leaving intact production of the same metabolite by alternative ones of the multiple metabolic routes.

15. (Withdrawn) A metabolically re-engineered organism developed in accordance with the method of claim 14

wherein the using of the generating vectors is to determine sets of reactions that, when deleted eliminate capability of the network to produce an output metabolite of interest;

Claims 16-27 (Canceled)